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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/549,698	07/14/2006	Masanori Sakai	2342-0142PUS1	9561

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BIRCH STEWART KOLASCH & BIRCH
PO BOX 747
FALLS CHURCH, VA 22040-0747

EXAMINER

CHEN, KEATH T

ART UNIT	PAPER NUMBER
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1709

NOTIFICATION DATE	DELIVERY MODE
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06/15/2007

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary

Application No.

10/549,698

Applicant(s)

SAKAI ET AL.

Examiner

Keath T. Chen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 09/19/2005.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

1. Recitation of claim 5 "film produced by reaction of said at least two gases is adhered to an inner wall of said gas supply member" does not add to structural limitation to the parent apparatus claim.

Recitation of claims 6-8 of the use of the cleaning gas and various source gases as gas supplies do not add any further structural limitation to the parent claims.

An apparatus that is capable of use the above cited gas or formation of film inside the gas supply member will meet claim limitations of 5-8. It has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. *Ex parte Masham*, 2 USPQ2d 1647 (1987).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. The term "a large number of gas injection opening" in line 3 of claim 2 is a relative term which renders the claim indefinite. The term "a large number" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Claim 2 will be examined as "more than one gas injection openings".

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-3 and 5-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Hatano (US 5709757, hereafter '757).

'757 teaches all limitations of claim 1:

A substrate processing apparatus (Fig. 3) having a processing chamber (inside the reaction tube #212) which accommodates a substrate or substrates (W) therein, and a heating member (#213) which heats said substrate or substrates, in which at least two gases (#208 and #209a-d) which react with each other (col. 15, lines 37-42, although introduces as a reactive gas mixture) are alternately supplied (capable of alternate supply gases through valves V21-V25) into said processing chamber to form a desired film or films (col. 15, line 38) on a surface or surfaces of said substrate or substrates, characterized by comprising: two supply tubes (tubes connected with valves V21-V25) through which said two gases respectively flow independently from each other (through controlling valves, the gases can flow independently); and a single gas supply member (to the left of wafer boat #214) which supplies said gases into said processing chamber and which has a portion extending to a region whose temperature is equal to or higher than a decomposition temperature of at least one of said two gases (heater is capable be adjusted to any suitable temperature for decomposition of gas), wherein said two

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supply tubes are connected to said gas supply member at a location (near #220, inside the tube #212, both supply tubes are connected to gas supply member through #220) whose temperature is lower (temperature at the bottom is lower than the top of reaction chamber, and the temperature at the bottom of chamber is adjusted by the setting of the heater) than the decomposition temperature of said at least one gas, and said two gases are supplied into said processing chamber through said gas supply member.

'757 further teaches the limitation of claim 2:

Said gas supply member is a nozzle having a large number of gas injection openings (as indicated in Fig. 3, the feed line, left of #214, has many openings).

'757 further teaches the limitation of claim 3:

A reaction tube (#212) which forms said processing chamber and which can accommodate a plurality of stacked substrates therein (stack of W on #214), wherein said nozzle extends from a lower portion to an upper portion of said reaction tube along a direction in which said substrates are stacked.

'757 is capable of performing the limitation of claim 5:

A film produced by reaction of said at least two gases is adhered to an inner wall of said gas supply member.

A film is capable of forming inside the gas supply member either by choosing the reaction gases or by setting the temperature.

'757 further teaches the limitation of claim 6:

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Cleaning gas (any of #209a-209d) is supplied into said processing chamber through said gas supply member to carry out a cleaning operation of said processing chamber and a removing operation of said film adhered to said gas supply member.

'757 is capable of holding the gases in the limitations of claim 7 and 8, although it does not explicitly cite the use of these gases:

Claim 7: said gases are trimethyl aluminum and ozone, and an aluminum oxide film or films are formed on a surface or surfaces of said substrate or substrates.

Claim 8: said gases are tetrakis (N-ethyl-N-methyl amino) hafnium and ozone, and a hafnium oxide film or films are formed on a surface or surfaces of said substrate or substrates.

'757 teaches all limitations of claim 9:

A substrate processing apparatus comprising a hot wall type processing furnace (Fig. 3 has heater #213 heating on the reactor wall) which includes a processing chamber which accommodates a substrate or substrates therein and a heating member which is disposed outside of said processing chamber (#213 is outside of #212) and which heats said substrate or substrates, wherein at least two gases which react with each other are alternately supplied into said processing chamber to produce a desired film or films on a surface or surfaces of said substrate or substrates, characterized by comprising: two supply tubes through which said two gases respectively flow independently from each other; and a single gas supply member which supplies said gases into said processing chamber, and which has a portion disposed inside of said heating member (the chamber #212 is inside the heating member #213), wherein said

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two supply tubes are connected to said gas supply member in a region whose temperature is lower than a temperature in said processing chamber in the vicinity of said substrate or substrates, and said two gases are supplied into said processing chamber through said gas supply member.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over '757, further in view of Miyazaki et al. (US 5252133, hereafter '133).

'757 teaches all limitations of claim 1, as discussed above.

'757 does not teach the limitation of claim 4:

Said two supply tubes and said gas supply member are connected to each other in said processing chamber.

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'133 is an analogous art in the field of vertically oriented CVD apparatus, particularly in solving the problem of uniformity of deposition or cleaning (col. 2, lines 62-65, and Fig. 7; for '757, col. 1, lines 47-50). '133 teaches the use of one gas inlet tubes (Fig. 1, #30') with two independent supply tubes (#221 and #222) connected to each other inside the processing chamber (#10) for the purpose of supplying gas with uniform concentration (col. 2, lines 3-6).

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have combined '133 with '757. Specifically, by connecting both gas supply tubes and gas supply members inside the reaction chamber as disclosed in '133 to the apparatus in Fig. 3 of '757 for the purpose of improving the gas uniformity, to have obtained the invention of claim 4.

7. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over '757, further in view of Raaijmakers et al. (US 20010024387, hereafter '387).

'757 teaches an apparatus with the capability of claim 1, as discussed above.

'757 does not teach the method of "at least two gases which react with each other are alternately supplied ..." and "two gases are alternately supplied into said processing chamber through said gas supply member".

'387 is an analogous art in the field of CVD ([0012], last sentence, and '757, lines 11-16), particularly to overcome the shortcoming of CVD ([0013], lines 3-5). '387 teaches the method of forming film by alternating metal source gas and oxygen source gas, for the benefit of "the resultant metal-containing monolayer is desirably self-

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terminating, such that any excess constituents of the first chemistry do not further react with the monolayer formed by this process" ([0055], lines 8-11).

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have combined '387 with '757. Specifically, by applying the process taught by '387 in the apparatus provided by '757 to execute the processing sequence, to have obtained the invention of claim 10.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US RE36328 is cited for nozzle with tubes connected inside chamber. US 4529474, 20010050054, 20030049372, 6146461, 6074486, 20030213435 are cited for nozzle. US 5484484 is cited for nozzle and process sequence.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Keath T. Chen whose telephone number is 571-270-1870. The examiner can normally be reached on M-F, 8:30-5:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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kc


MICHAEL B. CLEVELAND
SUPERVISORY PATENT EXAMINER